
Preparing Students for College Level Textbooks

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So often, students go to the college bookstore with their class lists and are stunned when they are handed textbooks 3 inches thick. The overwhelming feeling when they stare down at this stack quickly turns into, "I'll never be able to learn all of this." Once they finally get the courage to tackle the text, they frequently don't know how to proceed. Students often struggle with identifying the most important ideas, sorting main ideas from supporting details, and seeing the relationships within the material.

While this subject could fill the pages of a textbook of its own, this project will identify the major areas of textbook reading and provide some strategies the students can use when tackling their first college level reading material. It will include sample texts and worksheets for the teacher to use to guide their students through the process of complex academic material.

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1. The Reading Environment

For many students, the problems with textbook reading start before they open the book. A poorly devised study area will create many issues that will prevent effective learning. Students should learn that with a little planning, they could get around many of the detrimental elements that can hamper the ability to learn material from their textbooks. While some of these recommendations may seem obvious, others are more subtle. Either way, they need to be addressed in order to find the optimum reading environment. This is a checklist for students to use to create the environment they need:

Finding the Optimum Location for Reading and Studying

Whether in the same place every time, or a new location as the mood hits, finding the right place to read can make the difference between effective understanding and total lack of comprehension. Here are some tips:

- Location. Find a location that will allow you to work uninterrupted. Working at home is best for some people, but unless you live alone, the living room, or kitchen table are out of the question. Creating a space that is out of the "high traffic areas" in your home can be very effective. Your college library can be a great choice if you prefer to get away. Also, most colleges have study rooms in the library if you prefer to be more isolated. The problem with libraries, however, is that they may not be open during your peak performance hours.
- Comfort. The location should be comfortable, but not so comfortable that you get sleepy. You will want to be able to stay awake and alert, but not constantly fidgeting because the chair is uncomfortable.
- Lighting. Make sure the lighting is appropriate for the task. If the lighting is too low, it will cause eyestrain. If it's too harsh, the glare off the page can also cause problems. Bad lighting can result in strain, fatigue, and low reading efficiency.
- Ventilation. A stuffy room will make you sleepy. A windy park will cause distractions as you fight with the pages. Fresh air and a light breeze are good.
- Temperature. Like ventilation, temperature can have a huge effect on your ability to work. Too warm, and you'll be dozing off; too cold, and you'll spend more time shivering than studying. For most people, a spot that is slightly cool is ideal.
- Seating. The proper chair can make all the difference. The chair should allow you to have your feet flat on the floor, your thighs in a horizontal position, and your arms at the height of the desk. If the chair is too high or too low, it can cause strain on your back and legs, making you uncomfortable and less efficient. The seat back should be padded to support the curve of your back (or bring a pillow to add behind your back), and the seat cushion should be soft enough for you to sit for an extended period of time.

- Reading position. It is advisable to read in a seated position. Many students say, "I always lay down on my bed to read," and then wonder why they have trouble completing the assignment. Your body knows your bed is for sleeping; that's what it will try to do when you lay down, especially if the text isn't overly exciting.
- Music. Many students ask, "Can I study with music?" The answer is yes and no. Most studies show that when students listen to music with lyrics while studying, they are less effective in their work. The brain may spend more time singing along with the music than focusing on the words on the page. However, music without lyrics can be helpful for some people because it may enhance the brain's ability to absorb information.
- Distractions. If you're studying in a noisy room, with the TV blaring and children playing around you, you're very unlikely to remember any of what you're reading. Sitting next to a window may seem like a good idea at first, but when you spend more time watching the people outside enjoying a beautiful day than looking at your notes, it's time to pull the shades.
- Focal Distance and Reading Angle. For most people, the best placement of the reading material is 15" to 25" away from the eyes. If you have your material closer than this, you should see your optometrist about new glasses! It's also best if the reading material is about 60° above horizontal. This angle produces less eyestrain, as well as neck and back strain if you're hunched over the desk, trying to read.
- Supplies. Make sure you have everything you need to study before you sit down. Getting up to find a pencil or a highlighter, going back to your car to get your notebook, or not being able to find your syllabus to know what page to start on will all affect the flow of your work and interrupt your ability to work.
- Cell Phones. Smart phones make life easier, but they also are an endless supply of distractions. Turn it off! Don't just put it on silent because those little lights can keep flashing. Most of the time, you can live without being in constant contact with the world. Facebook will still be there when you're finished reading.

2. Using Graphic Organizers

Many students find graphic organizers useful tools to help with reading comprehension. Graphic organizers can be effective study guides, providing a visual model of the information the student is learning. Different types of organizers exist for a variety of uses. They can provide a visual representation of a general overview of information, links between causes and effects, relationships between main ideas and support details, the steps in a sequence, or comparisons and contrasts. In the appendix are blank, printable versions of the graphic organizers discussed in this section.

Double Entry Diary

The Double Entry Diary is ideal for helping the learner keep track of important information as he/she reads. The first column provides space for direct quotations from the source material. The second column is used for questions, reactions, and responses to that quote. This allows the reader to have a record of the important points in the text, as well as being able to have their own commentary on the information.

Research Commentary

Similar to the Double Entry Diary, the Research Commentary organizer allows to students to collect their thoughts and opinions on information they've read. This differs from the Double Entry Diary in that the Research Commentary allows for multiple sources per page.

Concept Wheel

The Concept Wheel is useful in helping students connect the pieces of a new idea. Students will start with the concept in the middle of the wheel and then add information such as definitions, summaries, examples, non-examples, important features, and relationships to other concepts. Students could use a set of these in classes like biology or chemistry to organize the new theories and see the relationships among them.

Venn Diagram

Included are two types of Venn Diagrams: a two-topic and a three-topic. Venn Diagrams are used to compare and contrast different topics. The student will write the traits unique to each topic on the sides of the diagram and write shared traits in the middle. On the three-topic diagram, space is available for unique traits, traits shared by two of the topics, and traits shared by all three topics.

Fishbone Diagram

Fishbone Diagrams help organize a series of causes or complex events that result in a single event. Students can identify up to 6 major causes and the two related causes for each. They can then use that to see the relationship between multiple causes and the final outcome. While this can be particularly useful in classes such as history (when examining something like the causes of the Civil War), it has also found use in problem solving situations such as computer programming.

Cause & Effect

The simplified Cause & Effect organizer allows students to see a single chain of cause to effect to a second effect. The rows could be connected further to create longer chains. This organizer may be more useful in physical science classes; however, with slight modification, it could also be used to create a chain of steps for solving equations in algebra or similar classes.

Story Map

Most useful when examining literature, the Story Map will allow the student to chart the major events in the story's plot as well as list characters, settings, goals, and themes. This can be used for short stories, novels, or dramas.

Event Map

The Event Map reads like reporter notes for a newspaper article, asking the all-important: Who, What, Where, When, Why, and How? Starting from the event name in the center of the wheel, the student will answer these questions around the spokes to create a picture of what happened during the event. This will be useful in the humanities, but also could be utilized for science experiments.

3. Dealing with New Vocabulary

a. Using Your Dictionary

1. Choose the right dictionary

College student will want to have access to a good dictionary whenever they study. Be sure to equip your study area with a large dictionary that will suit your needs. Webster's New World College Dictionary, 4th Edition and Merriam-Webster's Collegiate Dictionary, 11th Edition are both good choices. Also, a smaller, more portable dictionary to carry with you in your book bag is also a good idea.

As an alternative, many online dictionaries have smart phone apps that are quite good, and often free to use. Dictionary.com has a very good, easy to use, and free to install app that could replace both your large, hardbound dictionary and your pocket dictionary.

As you progress in your degree, you may find that a standard dictionary is not sufficient. You may need to add a dictionary for your career-specific jargon. Biology, chemistry, engineering, and other technical fields all have dictionaries specifically designed for their unique vocabulary.

2. Read the introduction

As with any book, the introduction to your dictionary will provide you with a great deal of useful information. Most will give examples of what you will find in each entry, guides to spelling and grammar (including irregular verb forms), assistance with pronunciation (including number of syllables and which one is accented), and more. By understanding the way your specific dictionary is organized, your use of the dictionary will be more efficient.

3. Learn the abbreviations

Dictionaries are filled with abbreviations. These could include parts of speech, usage, language of origin, cross references, and more. Many dictionaries will include a comprehensive list of these (often located on the first or last page of the dictionary) that will guide you in their usage. It is highly recommended that you find this page and learn many of the common abbreviations.

4. Learn the pronunciation key

All dictionaries will include a pronunciation key to allow you to learn the standard pronunciation(s) of each entry. Be aware that each dictionary uses its own style and symbols, and that the symbols in one dictionary may not correspond to the symbols in another (and sometimes may contradict each other). Your dictionary will include a key word for you to use as a model for pronouncing the new word.

Note: some words have multiple correct pronunciations. Some words have national and regional variations. Many dictionaries will highlight national variations, particular American versus British pronunciations. One of the advantages to using an electronic dictionary (such as a smart phone

dictionary app) is that most include an audio file that allows you to hear the word in all of its variations. It is often wise to learn the various pronunciations of the words, as you will be exposed to a diverse group of students and teachers while in college.

5. Parts of an Entry

- a. Definition
- b. Correct (or multiple) spellings
- c. Pronunciation
- d. Part of speech
- e. Language of Origin
- f. Sample sentence

The Oxford Dictionaries website has a series of worksheets designed to help students become more familiar with properly using a dictionary, and using it to its fullest extent. Below is the link to the page of activities:

<http://www.oxforddictionaries.com/us/words/11-activities>

Name _____

Dictionary Skills Worksheet

Directions: Using a dictionary, find the answer to each of the following scenarios.

1. If you were **beautifying** your neighborhood park, what might you be doing to it? _____
2. If you didn't understand the **lingo** used in a book, what don't you understand? _____
3. If an artist asked to hold their **palette**, what would you be holding? _____
4. If you were told that the water in your house was not **potable**, what would you do. _____
5. If a doctor used a **rhinoscope** to examine you, what body part would they be looking at? _____
6. If your friend said she was growing **spelt**, what would she be growing? _____
7. Where would you find a **hackamore**? _____
8. Where might you find an **exergue**? _____
9. When running, if your are feeling **lethargic** what should you do? _____
10. If you hired a **pettifogger**, who would you be hiring? _____
11. If your shirt **reeks**, what should you do with it? _____
12. If you owned a **sesterce**, what would you do with it? _____
13. Name three living things that are **apodal**? _____

Name _____

Dictionary Skills Key

Directions: Using a dictionary, find the answer to each of the following scenarios.

1. If you were **beautifying** your neighborhood park, what might you be doing to it? _____
making it prettier
2. If you didn't understand the **lingo** used in a book, what don't you understand? _____
words specific to one area of study
3. If an artist asked to hold their **palette**, what would you be holding? _____
the plate where they are keeping the paint they are using
4. If you were told that the water in your house was not **potable**, what would you do. _____
buy bottled water
5. If a doctor used a **rhinoscope** to examine you, what body part would they be looking at? _____
nose
6. If your friend said she was growing **spelt**, what would she be growing? _____
wheat
7. Where would you find a **hackamore**? _____
on a horse
8. Where might you find an **exergue**? _____
on a coin or medal
9. When running, if you are feeling **lethargic** what should you do? _____
stop and rest
10. If you hired a **pettifogger**, who would you be hiring? _____
a cheating lawyer
11. If your shirt **reeks**, what should you do with it? _____
wash it
12. If you owned a **sesterce**, what would you do with it? _____
sell it and be rich
13. Name three living things that are **apodal**? _____
fish, snakes, whales

b. Using Your Thesaurus

At first glance, using a thesaurus seems very straightforward: look up the word you want to replace, pick the one you like, and insert it into your writing. However, there is more to it than that. First, it is important to make sure the definition of the new word is exactly what you want it to be. A thesaurus entry may have many words listed that have similar meanings but with subtle nuances that create a new idea within the sentence. With that in mind, here are some steps to using a thesaurus when writing.

1. Find the entry for the word you wish to replace.
2. Use a dictionary to check the definitions of any words that you do not already know.
3. Check to make sure the new word is of the correct part of speech, adjust it if necessary.
4. Finally, do not overuse your thesaurus. Replacing too many words makes your writing seem amateurish because it can create jarring changes between your standard writing style and the new vocabulary.

Name _____

Thesaurus Skills Worksheet

Directions: Using a thesaurus, find a suitable word to replace the underlined word in each sentence

1. Why do bats seem so disgusting? Do we really think a flying mouse-like creature is distasteful?

2. My parents criticized me for getting sunburned, by my blistered skin hurt more than their scolding.

3. The horror story featured open graves, walking corpses, and a devilish villain who turned an entire town full of people into zombies.

4. It doesn't take much to destroy an already shaky relationship. Something slight can cause an unstable relationship to collapse.

5. Even if I were rich, I wouldn't pay \$300 for those shoes. That's an extremely high price.

6. As the cinnamon bread baked, a wonderful smell came out of the kitchen.

7. Although the mayor had been accused of taking bribes, he still had some faithful supporters.

8. In the phrase "rich millionaire," the word *rich* is unnecessary. All millionaires are rich.

9. Florence reached the highest point in her career when she became president of Ace Products.

10. Years of illegal activities resulted in Gene's being sentenced to serve a life term in prison.

Name _____

Thesaurus Skills Key

Directions: Using a thesaurus, find a suitable word to replace the underlined word in each sentence

1. Why do bats seem so **disgusting**? Do we really think a flying mouse-like creature is distasteful?

repugnant

2. My parents **criticized** me for getting sunburned, by my blistered skin hurt more than their scolding.

chide

3. The horror story featured open graves, walking corpses, and a **devilish** villain who turned an entire town full of people into zombies.

diabolical

4. It doesn't take much to destroy an already **shaky** relationship. Something slight can cause an unstable relationship to collapse.

tenuous

5. Even if I were rich, I wouldn't pay \$300 for those shoes. That's an **extremely high** price.

exorbitant

6. As the cinnamon bread baked, a wonderful smell **came out** of the kitchen.

emanated

7. Although the mayor had been accused of taking bribes, he still had some **faithful** supporters.

staunch

8. In the phrase "rich millionaire," the word *rich* is **unnecessary**. All millionaires are rich.

superfluous

9. Florence reached the **highest point** in her career when she became president of Ace Products.

zenith

10. Years of **illegal** activities resulted in Gene's being sentenced to serve a life term in prison.

illicit

c. Using Flashcards

Flashcards are often the most useful method of learning new vocabulary. There are several methods for creating flashcards. The most important thing to remember is to make them useful and to provide enough information to learn the new words.

Front

<p>Neatly print the new word</p>

Back

<p>The definition, written in your own words. Dictionary definitions may not be as easy to learn, so it's better to use your own definition.</p>	<p>Part of speech</p>
<p>Pronunciation guide</p>	<p>Sample sentence. Make sure that it uses the word in a way that makes the meaning as clear and easy to understand as possible.</p>

e. Useful Internet and Smart Phone Resources

Many apps for cell phones and tablets exist to help create new electronic flashcards.

For Android

Flashcard Maker Pro from Great White Software

Flashcard Deluxe from OrangeorApple.com

For iPad/iPhone

Evernote Peek by Evernote

Chegg Flashcards by Chegg, Inc

STUDYBLUE by StudyBlue, Inc

For the computer

www.quizlet.com

Quizlet's flashcards, tests, and study games make learning fun and engaging for students of all ages.

www.cram.com

over 80million flashcards to choose from, or create your own

Some useful websites for vocabulary building include:

<http://dynamo.dictionary.com/>

Includes word lists, flashcards, and quizzes

<http://www.vocabularycoach.com/>

Quiz site with over 4000 words

<http://grammar.ccc.commnet.edu/grammar/vocabulary.htm>

Has more than 20 quizzes to test college level vocabulary

4. SQR3

Use the SQR3 method of reading to be an active and effective reader. The passive reader learns little. The aggressive reader organizes information and answers questions. SQR3: survey, question, read, recite, review.

The SQR3 Method of Reading

Survey the chapter.

Read the introduction to the chapter.

Look over the major section headings. Glance at the figures.

Skim questions, key words and summaries at the end of the chapter.

Create a context for remembering information.

Generate interest and a sense of what is important.

Plan your study session. Set a time limit for working. Include breaks and rewards.

Question. Create and answer questions.

For each section in the chapter, ask these 4 basic questions:

1. What is the main point?
2. What evidence supports the main point?
3. What are the applications or examples?
4. How is this related to the rest of the chapter, the book, the world, to me?

Read the section.

Skim or read the section actively. Search for the answers to your questions.

Make notes in the margins to create your own organization.

Recite the main points.

Look up from the book and verbalize the answers to your questions.

Talk out loud and listen to the answers. Recite to remember.

Review.

Now go back and highlight or underline the main points in the section.

Add more notes in the text and margin.

Repeat SQR3 for each section; mini-survey, question, read, recite and review. When finished, create a one page hierarchical summary of the entire chapter. Now do any homework assignments. Use your summary first, then the text. Review often and reward yourself for a job well done.

5. Annotation

Annotating a text can be the single most useful skill a student can develop when learning to study and learn from their textbooks. “Annotating helps readers reach a deeper level of engagement and promotes active reading.” (Porter-O'Donnell 82) This reading-writing-learning strategy will enable students to get a deeper understanding of what they are reading while preparing themselves to participate in classroom discussions, complete assignments, and successfully master the material for examinations.

The biggest problem students face is learning what is most important. All too often students start with their highlighters and mark every word on the page. Students must learn to carefully choose the most important segments to highlight and to use the margins to make notes while reading and rereading.

In the Appendix, I've included an excellent lesson developed by the Hunter College Reading/Writing Center on text annotation. I've also included two pages from a textbook that will allow students a chance to practice these new skills.

Appendix

Graphic Organizers	21
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Physical Geography text to annotate	36
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Graphic Organizers

Subject _____

Date _____

Research Commentary

Information/Quotation

Source

Commentary

Commentary

Information/Quotation

Source

Commentary

Commentary

Information/Quotation

Source

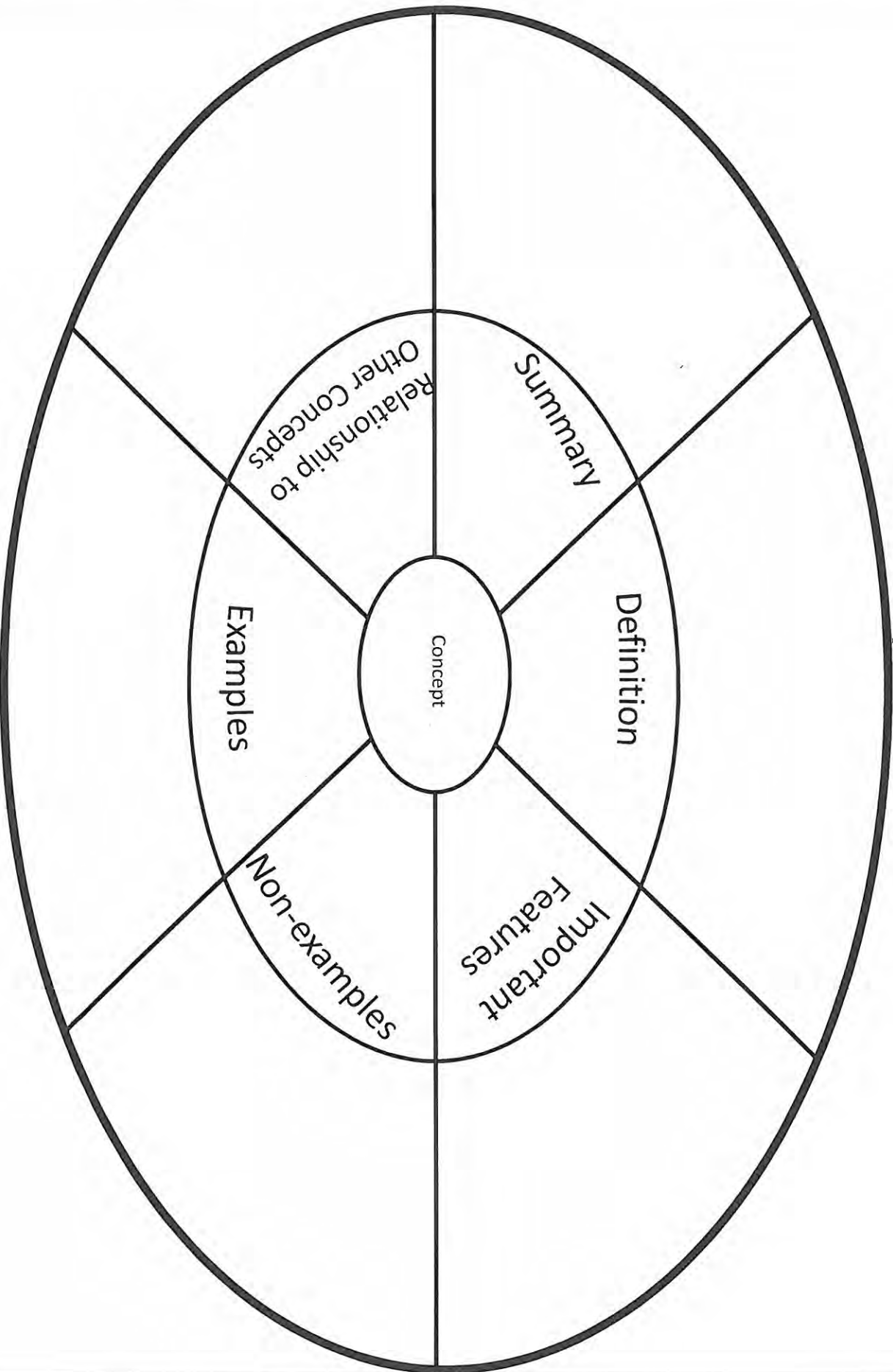
Commentary

Commentary

Subject _____

Date _____

Concept Wheel



Subject _____

Date _____

Venn Diagram

What are you comparing and contrasting? _____

Topic #1

Topic #2

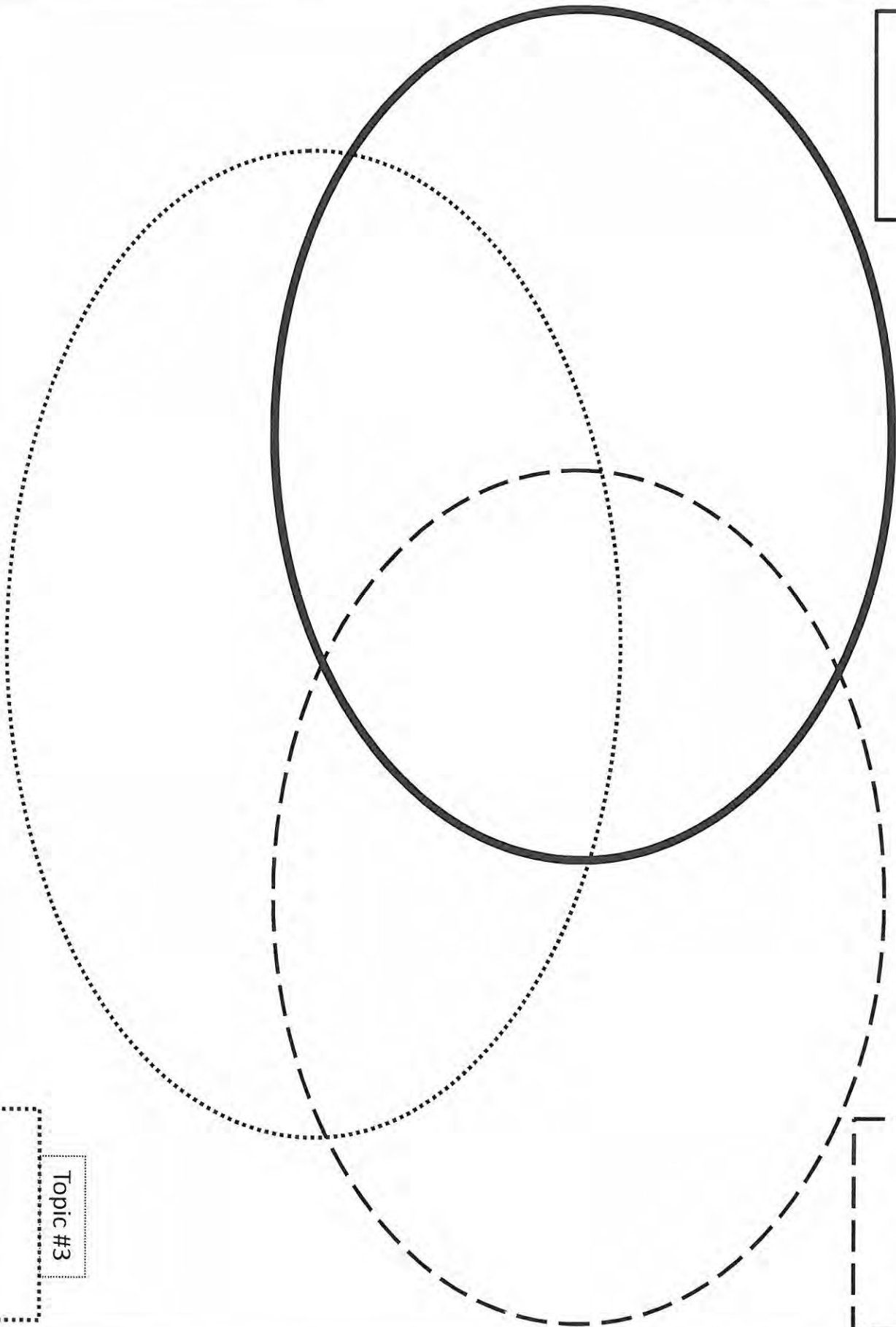
Similarities

Differences

Subject _____

Date _____

Topic #1



Topic #2

Topic #3

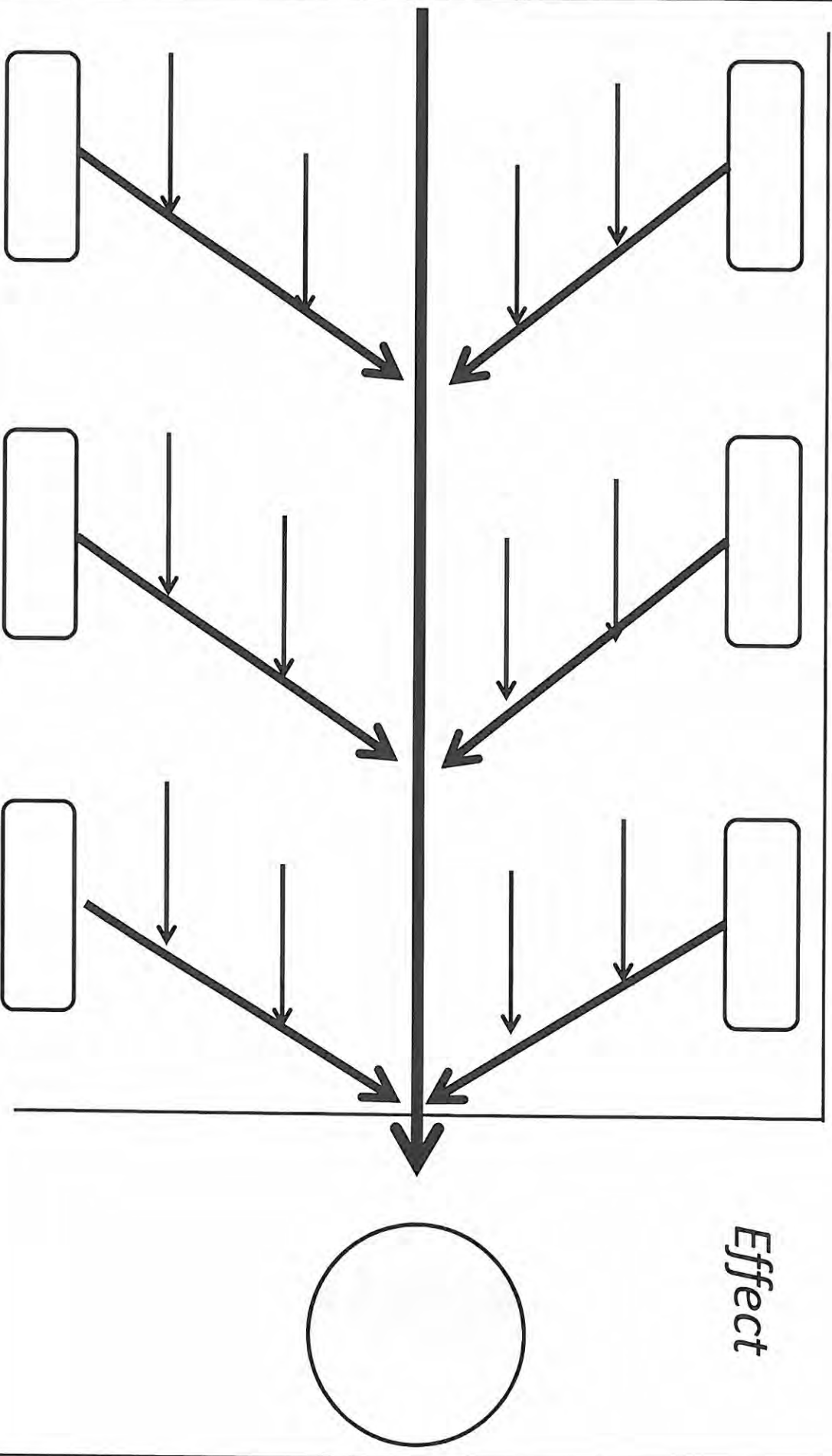
Subject _____

Date _____

Fishbone Diagram

Causes

Effect



Subject _____

Date _____

Cause & Effect

Cause

Effect/Cause

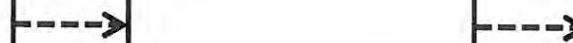
Effect



Cause

Effect/Cause

Effect



Cause

Effect/Cause

Effect



Cause

Effect/Cause

Effect



Class _____

Date _____

Story Map

Title:

Author:

Characters:

Setting:

Goals/Problems/Conflicts:

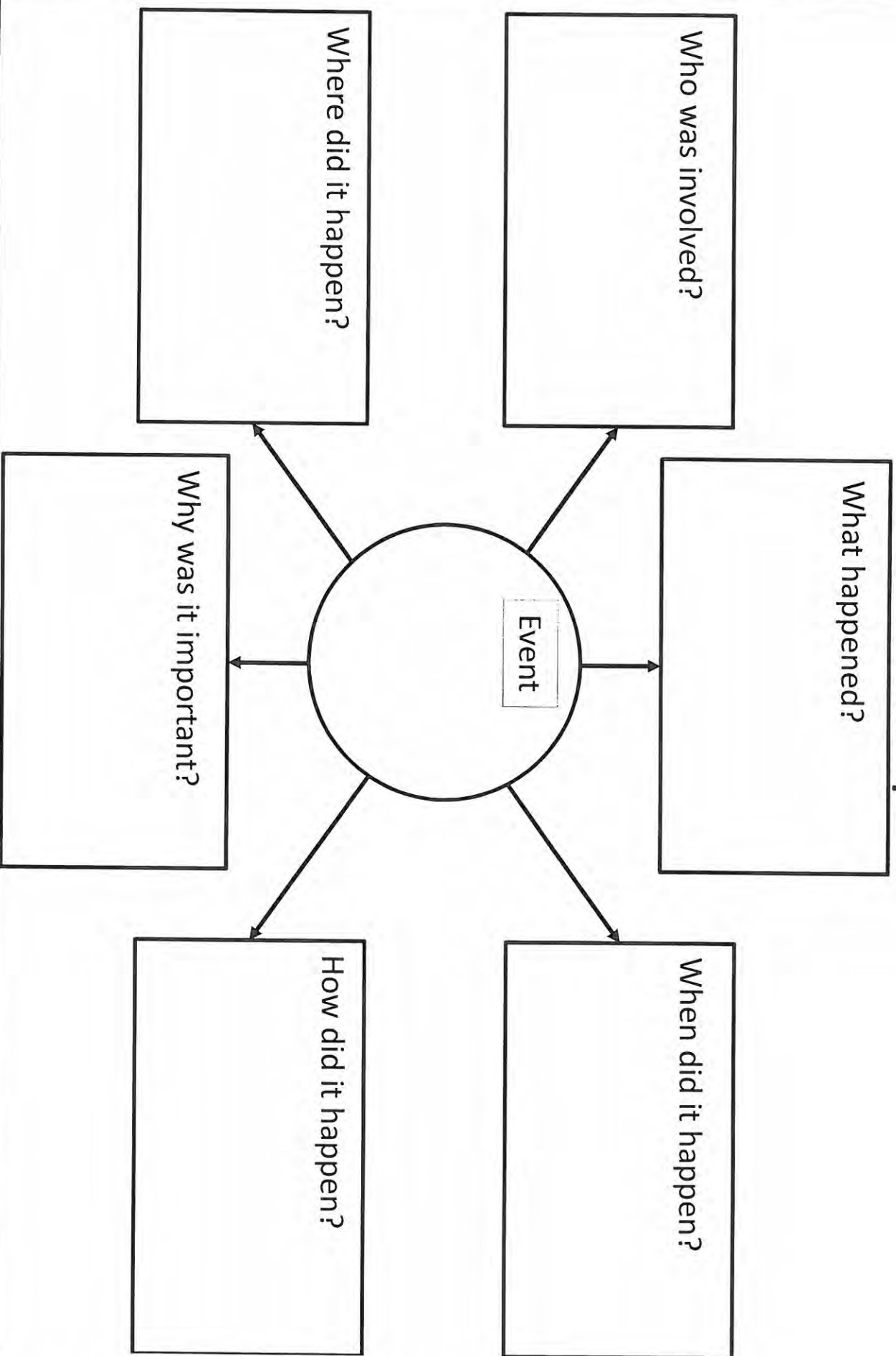
Major Events

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Resolution:

Theme:

Event Map



HUNTER COLLEGE READING/WRITING CENTER
THE WRITING PROCESS
Invention: Annotating a Text

Annotating a text, or marking the pages with notes, is an excellent, if not essential, way to make the most out of the reading you do for college courses. Annotations make it easy to find important information quickly when you look back and review a text. They help you familiarize yourself with both the content and organization of what you read. They provide a way to begin engaging ideas and issues directly through comments, questions, associations, or other reactions that occur to you as you read. In all these ways, annotating a text makes the reading process an active one, not just background for writing assignments, but an integral first step in the writing process.

A well-annotated text will accomplish all of the following:

- clearly identify where in the text important ideas and information are located
- express the main ideas of a text
- trace the development of ideas/arguments throughout a text
- introduce a few of the reader's thoughts and reactions

Ideally, you should read a text through once before making major annotations. You may just want to circle unfamiliar vocabulary or concepts. This way, you will have a clearer idea about where major ideas and important information are in the text, and your annotating will be more efficient.

A brief description and discussion of four ways of annotating a text and a sample annotated text follow:

! Highlighting/Underlining

Highlighting or underlining key words and phrases or major ideas is the most common form of annotating texts. Many people use this method to make it easier to review material, especially for exams. Highlighting is also a good way of picking out specific language within a text that you may want to cite or quote in a piece of writing. However, over-reliance on highlighting is unwise for two reasons. First, there is a tendency to highlight more information than necessary, especially when done on a first reading. Second, highlighting is the least active form of annotating. Instead of being a way to begin thinking and interacting with ideas in texts, highlighting can become a postponement of that process.

On the other hand, highlighting is a useful way of marking parts of a text that you want to make notes about. And it's a good idea to highlight the words or phrases of a text that are referred to by your other annotations.

! Paraphrase/Summary of Main Ideas

Going beyond locating important ideas to being able to capture their meaning through paraphrase is a way of solidifying your understanding of these ideas. It's also excellent preparation for any writing you may have to do based on your reading. A series of brief notes in the margins beside important ideas gives you a handy summary right on the pages of the text itself, and if you can take the substance of a sentence or paragraph and condense it into a few words, you should have little trouble clearly demonstrating your understanding of the ideas in question in your own writing.

! Descriptive Outline

A descriptive outline shows the organization of a piece of writing, breaking it down to show where ideas are introduced, where they are developed, and where any turns in the development occur. A descriptive outline allows you to see not only where the main ideas are but also where the details, facts, explanations, and other kinds of support for those ideas are located.

A descriptive outline will focus on the function of individual paragraphs or sections within a text. These functions might include any of the following:

- Summarizing a topic/argument/etc.
- Introducing an idea
- Adding explanation
- Giving examples
- Providing factual evidence
- Expanding or limiting the idea
- Considering an opposing view
- Dismissing a contrary view
- Creating a transition
- Stating a conclusion

This list is hardly exhaustive and it's important to recognize that several of these functions may be repeated within a text, particularly ones that contain more than one major idea.

Making a descriptive outline allows you to follow the construction of the writer's argument and/or the process of his/her thinking. It helps identify which parts of the text work together and how they do so.

! Comments/Responses

You can use annotation to go beyond understanding a text's meaning and organization by noting your reactions—agreement/disagreement, questions, related personal experience, connection to ideas from other texts, class discussions, etc. This is an excellent way to begin formulating your own ideas for writing assignments based on the text or on any of the ideas it contains.

anecdote

Albert Einstein, for one, could never accept this world view. In on-again, off-again debates over more than a dozen years, Bohr and Einstein argued the issues—always in a spirit of great mutual admiration and respect. I made my own effort to convince Einstein, but without success. Once, around 1942, I went around to his house in Princeton to tell him of a new way of looking at the quantum world developed by my student, Richard Feynman.

Einstein didn't accept this

I'm with Einstein on this.

name-dropper!

second interpretation

Feynman pictured an electron getting from point A to point B not by one or another possible path, but by taking all possible paths at once. Einstein, after listening patiently, said, as he had on other occasions, "I still cannot believe God plays dice." Then he added, "But maybe I have earned the right to make my mistakes."

Feynman proposed another explanation.

Einstein recognizing the limits of science?

third interpretation

Feynman's superposed paths are eerie enough. In the 1970s, I got interested in another way to reveal the strangeness of the quantum world. I called it "delayed choice." You send a quantum of light (a photon) into an apparatus that offers the photon two paths. If you measure the photon that leaves the apparatus in one way you can tell which path it took.

Another explanation is "delayed choice."

explanation of third interpretation

If you measure the departing photon in a different way (a complementary way), you can tell if it took both paths at once. You can't make both kinds of measurements on the same photon, but you can decide, after the photon has entered the apparatus, which kind of measurement you want to make.

You can look at 2 measurements, but not both at once.

explanation, continued

This makes no sense. What's too bad?

Is the photon already wending its way through the apparatus along the first path? Too bad. You decide to look to see if it took both paths at once, and you find that it did. Or is it progressing along both paths at once? Too bad. You decide to find out if it took just one path, and it did.

Your "delayed choice" of how to measure influences the outcome.

anecdote

But does a lab have anything to do with the "real" cosmos?

At the University of Maryland, Carroll Alley, with Oleg Jakubowicz and William Wickes, took up the challenge I offered them and confirmed that the outcome could be affected by delaying the choice of measurement technique—the choice of question asked—until the photon was well on its way. I like to think that we may one day conduct a delayed-choice experiment not just in a laboratory, but in the cosmos.

theory confirmed in lab; may be confirmed in cosmos some day

analogy

One hundred years is, after all, not so long a time for the underpinning of a wonderfully successful theory to remain murky. Consider gravity. Isaac Newton, when he published his monumental work on gravitation in the 17th century, knew he could not answer the question, "How come gravity?" He was wise enough not to try. "I frame no hypotheses," he said.

The "why" of gravity was a mystery at first, too.

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feedback! [View](#)We'll use your
feedback to review
ads on this site.Help us show you
better ads by
updating your
preferences.

CHAPTER 6: Energy and Matter

(h). Earth-Sun Geometry

Earth Rotation and Revolution

The term **Earth rotation** refers to the spinning of our planet on its axis. Because of rotation, the Earth's surface moves at the equator at a speed of about 467 m per second or slightly over 1675 km per hour. If you could look down at the Earth's North Pole from space you would notice that the direction of rotation is counter-clockwise (**Figure 6h-1**). The opposite is true if the Earth is viewed from the South Pole. One rotation takes exactly twenty-four hours and is called a **mean solar day**. The Earth's rotation is responsible for the daily cycles of day and night. At any one moment in time, one half of the Earth is in sunlight, while the other half is in darkness. The edge dividing the daylight from night is called the **circle of illumination**. The Earth's rotation also creates the apparent movement of the Sun across the horizon.

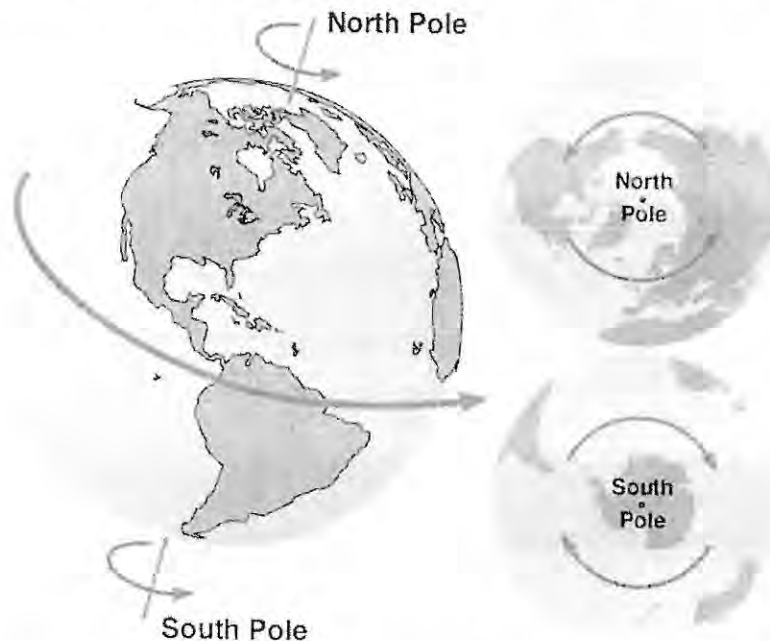


Figure 6h-1: The movement of the Earth about its axis is known as rotation. The direction of this movement varies with the viewer's position. From the North Pole the rotation appears to move in a counter-clockwise fashion. Looking down at the South Pole the Earth's rotation appears clockwise.

The orbit of the Earth around the Sun is called an **Earth revolution**. This celestial motion takes 365.26 days to complete one cycle. Further, the Earth's orbit around the Sun is not circular, but oval or **elliptical** (see **Figure 6h-2**). An elliptical orbit causes the Earth's distance from the Sun to vary over a year. Yet, this phenomenon is not responsible for the Earth's seasons! This variation in the distance from the Sun causes the amount of solar radiation received by the Earth to annually vary by about 6%. **Figure 6h-2** illustrates the positions in the Earth's revolution where it is closest and farthest from the Sun. On January 3, **perihelion**, the Earth is closest to the Sun (147.3 million km). The Earth is farthest from the Sun on July 4, or **aphelion** (152.1 million km). The

average distance of the Earth from the Sun over a one-year period is about 149.6 million km.

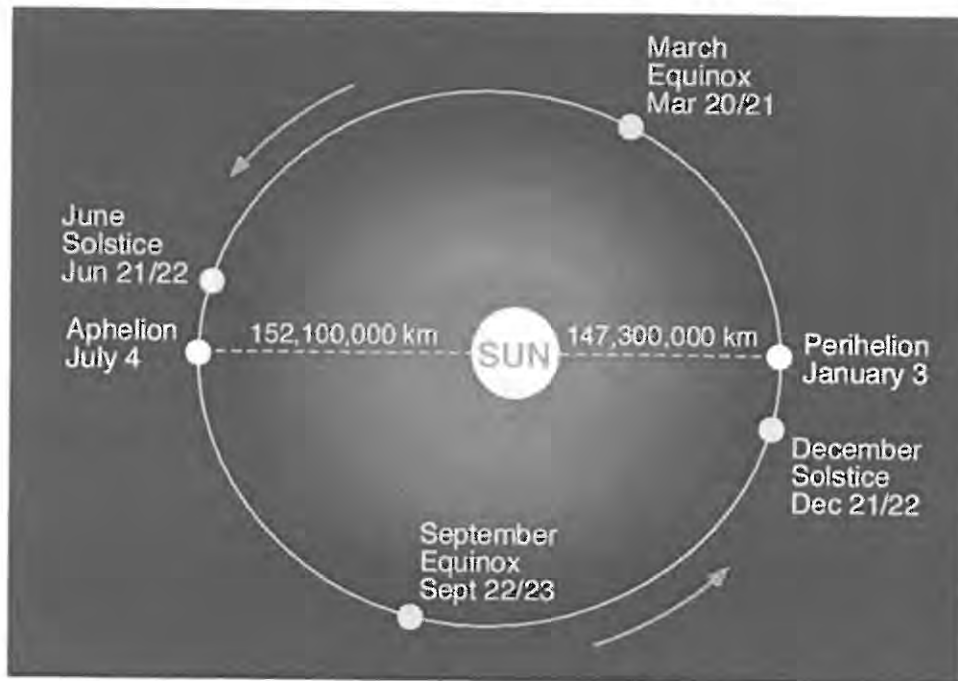


Figure 6h-2: Position of the equinoxes, solstices, aphelion, and perihelion relative to the Earth's orbit around the Sun.

Tilt of the Earth's Axis

The **ecliptic plane** can be defined as a two-dimensional flat surface that geometrically intersects the Earth's orbital path around the Sun. On this plane, the Earth's axis is not at right angles to this surface, but inclined at an angle of about 23.5° from the **perpendicular**. **Figure 6h-3** shows a side view of the Earth in its orbit about the Sun on four important dates: **June solstice**, **September equinox**, **December solstice**, and **March equinox**. Note that the angle of the Earth's axis in relation to the ecliptic plane and the North Star on these four dates remains unchanged. Yet, the relative position of the Earth's axis to the Sun does change during this cycle. This circumstance is responsible for the annual changes in the height of the Sun above the **horizon**. It also causes the **seasons**, by controlling the intensity and duration of sunlight received by locations on the Earth. **Figure 6h-4** shows an overhead view of this same phenomenon. In this view, we can see how the circle of illumination changes its position on the Earth's surface. During the two equinoxes, the circle of illumination cuts through the North Pole and the South Pole. On the June solstice, the circle of illumination is tangent to the Arctic Circle (66.5° N) and the region above this latitude receives 24 hours of daylight. The Arctic Circle is in 24 hours of darkness during the December solstice.

Useful Websites for Further Information

Four Part Lesson Plan on annotating texts

<http://www.readwritethink.org/classroom-resources/lesson-plans/teaching-student-annotation-constructing-1132.html>

Study Guides and Strategies

<http://www.studygs.net/index.htm>

Study Skills Inventory

<http://sarc.sdes.ucf.edu/form-studyskills>

College Study Skills Tips

<http://academictips.org/>

How to Study

<http://www.howtostudy.org/>

aberration

(*n.*) something that differs from the norm (In 1974, Poland won the World Cup, but the success turned out to be an aberration, and Poland have not won a World Cup since).

abhor

(*v.*) to hate, detest (Because he always wound up getting hit in the head when he tried to play cricket, Marcin began to abhor the sport).

acquiesce

(*v.*) to agree without protesting (Though Mr. Pospieszny wanted to stay outside and work in his garage, when his wife told him that he had better come in to dinner, he acquiesced to her demands.)

alacrity

(*n.*) eagerness, speed (For some reason, Simon loved to help his girlfriend whenever he could, so when his girlfriend asked him to set the table he did so with alacrity.)

amiable

(*adj.*) friendly (An amiable fellow, Neil got along with just about everyone.)

appease

(*v.*) to calm, satisfy (When Jerry cries, his mother gives him chocolate to appease him.)

arcane

(*adj.*) obscure, secret, known only by a few (The professor is an expert in arcane Kashubian literature.)

avarice

(*n.*) excessive greed (The banker's avarice led him to amass an enormous personal fortune.)

¹ (World-English.org)

brazen

(*adj.*) excessively bold, brash, clear and obvious (Critics condemned the writer's *brazen* attempt to plagiarise Frankow-Czerwonko's work.)

brusque

(*adj.*) short, abrupt, dismissive (Simon's *brusque* manner sometimes offends his colleagues.)

cajole

(*v.*) to urge, coax (Magda's friends *cajoled* her into drinking too much.)

callous

(*adj.*) harsh, cold, unfeeling (The murderer's *callous* lack of remorse shocked the jury.)

candor

(*n.*) honesty, frankness (We were surprised by the *candor* of the politician's speech because she is usually rather evasive.)

chide

(*v.*) to voice disapproval (Hania *chided* Gregory for his vulgar habits and sloppy appearance.)

circumspect

(*adj.*) cautious (Though I promised Marta's father I would bring her home promptly by midnight, it would have been more *circumspect* not to have specified a time.)

clandestine

(*adj.*) secret (Announcing to her boyfriend that she was going to the library, Maria actually went to meet George for a *clandestine* liaison.)

coerce

(*v.*) to make somebody do something by force or threat (The court decided that David Beckham did not have to honor the contract because he had been *coerced* into signing it.)

coherent

(*adj.*) logically consistent, intelligible (William could not figure out what Harold had seen because he was too distraught to deliver a coherent statement.)

complacency

(*n.*) self-satisfied ignorance of danger (Simon tried to shock his friends out of their complacency by painting a frightening picture of what might happen to them.)

confidant

(*n.*) a person entrusted with secrets (Shortly after we met, he became my chief confidant.)

connive

(*v.*) to plot, scheme (She connived to get me to give up my plans to start up a new business.)

cumulative

(*adj.*) increasing, building upon itself (The cumulative effect of hours spent using the World English website was a vast improvement in his vocabulary and general level of English.)

debase

(*v.*) to lower the quality or esteem of something (The large raise that he gave himself debased his motives for running the charity.)

decry

(*v.*) to criticize openly (Andrzej Lepper, the leader of the Polish Self Defence party decryed the appalling state of Polish roads.)

deferential

(*adj.*) showing respect for another's authority (Donata is always excessively deferential to any kind of authority figure.)

demure

(*adj.*) quiet, modest, reserved (Though everyone else at the party was dancing and going crazy, she remained demure.)

deride

(*v.*) to laugh at mockingly, scorn (The native speaker often derided the other teacher's accent.)

despot

(*n.*) one who has total power and rules brutally (The despot issued a death sentence for anyone who disobeyed his laws.)

diligent

(*adj.*) showing care in doing one's work (The diligent researcher made sure to double check her measurements.)

elated

(*adj.*) overjoyed, thrilled (When he found out he had won the lottery, the postman was elated.)

eloquent

(*adj.*) expressive, articulate, moving (The best man gave such an eloquent speech that most guests were crying.)

embezzle

(*v.*) to steal money by falsifying records (The accountant was fired for embezzling €10,000 of the company's funds.)

empathy

(*n.*) sensitivity to another's feelings as if they were one's own (I feel such empathy for my dog when she's upset so am I!)

enmity

(*n.*) ill will, hatred, hostility (John and Scott have clearly not forgiven each other, because the enmity between them is obvious to anyone in their presence.)

erudite

(*adj.*) learned (My English teacher is such an erudite scholar that he has translated some of the most difficult and abstruse Old English poetry.)

extol

(*v.*) to praise, revere (Kamila extolled the virtues of a vegetarian diet to her meat-loving boyfriend.)

fabricate

(*v.*) to make up, invent (When I arrived an hour late to class, I fabricated some excuse about my car breaking down on the way to work.)

feral

(*adj.*) wild, savage (That beast looks so feral that I would fear being alone with it.)

flabbergasted

(*adj.*) astounded (Whenever I read an Agatha Christie mystery novel, I am always flabbergasted when I learn the identity of the murderer.)

forsake

(*v.*) to give up, renounce (I won't forsake my conservative principles.)

fractious

(*adj.*) troublesome or irritable (Although the child insisted he wasn't tired, his fractious behaviour - especially his decision to crush his jam sandwiches all over the floor - convinced everyone present that it was time to put him to bed.)

furtive

(*adj.*) secretive, sly (Claudia's placement of her drugs in her sock drawer was not as furtive as she thought, as the sock drawer is the first place most parents look.)

gluttony

(*n.*) overindulgence in food or drink (Helen's fried chicken tastes so divine, I don't know how anyone can call gluttony a sin.)

gratuitous

(*adj.*) uncalled for, unwarranted (Every evening the guy at the fish and chip shop gives me a gratuitous helping of vinegar.)

haughty

(*adj.*) disdainfully proud (The superstar's haughty dismissal of her co-stars will backfire on her someday.)

hypocrisy

(*n.*) pretending to believe what one does not (Once the politician began passing legislation that contradicted his campaign promises, his *hypocrisy* became apparent.)

impeccable

(*adj.*) exemplary, flawless (If your grades were as *impeccable* as your brother's, then you too would receive a car for a graduation present.)

impertinent

(*adj.*) rude, insolent (Most of your comments are so *impertinent* that I don't wish to dignify them with an answer.)

implacable

(*adj.*) incapable of being appeased or mitigated (Watch out: once you shun Grandmother's cooking, she is totally *implacable*.)

impudent

(*adj.*) casually rude, insolent, impertinent (The *impudent* young woman looked her teacher up and down and told him he was hot.)

incisive

(*adj.*) clear, sharp, direct (The discussion wasn't going anywhere until her *incisive* comment allowed everyone to see what the true issues were.)

indolent

(*adj.*) lazy (Why should my *indolent* children, who can't even pick themselves up off the sofa to pour their own juice, be rewarded with a trip to Burger King?)

inept

(*adj.*) not suitable or capable, unqualified (She proved how *inept* she was when she forgot two orders and spilled a pint of cider in a customer's lap.)

infamy

(*n.*) notoriety, extreme ill repute (The *infamy* of his crime will not lessen as time passes.)

inhibit

(*v.*) to prevent, restrain, stop (When I told you I needed the car last night, I certainly never meant to *inhibit* you from going out.)

innate

(*adj.*) inborn, native, inherent (His incredible athletic talent is *innate*, he never trains, lifts weights, or practices.)

insatiable

(*adj.*) incapable of being satisfied (My *insatiable* appetite for blondes was a real problem on my recent holiday in Japan!)

insular

(*adj.*) separated and narrow-minded; tight-knit, closed off (Because of the sensitive nature of their jobs, those who work for MI5 must remain *insular* and generally only spend time with each other.)

intrepid

(*adj.*) brave in the face of danger (After scaling a live volcano prior to its eruption, the explorer was praised for his *intrepid* attitude.)

inveterate

(*adj.*) stubbornly established by habit (I'm the first to admit that I'm an *inveterate* cider drinker—I drink four pints a day.)

jubilant

(*adj.*) extremely joyful, happy (The crowd was *jubilant* when the firefighter carried the woman from the flaming building.)

knell

(*n.*) the solemn sound of a bell, often indicating a death (Echoing throughout our village, the funeral *knell* made the grey day even more grim.)

lithe

(*adj.*) graceful, flexible, supple (Although the dancers were all outstanding, Joanna's control of her *lithe* body was particularly impressive.)

lurid

(adj.) ghastly, sensational (Barry's story, in which he described a character torturing his neighbour's tortoise, was judged too lurid to be published on the English Library's website.)

maverick

(n.) an independent, nonconformist person (John is a real maverick and always does things his own way.)

maxim

(n.) a common saying expressing a principle of conduct (Ms. Stone's etiquette maxims are both entertaining and instructional.)

meticulous

(adj.) extremely careful with details (The ornate needlework in the bride's gown was a product of meticulous handiwork.)

modicum

(n.) a small amount of something (Refusing to display even a modicum of sensitivity, Magda announced her boss's affair to the entire office.)

morose

(adj.) gloomy or sullen (David's morose nature made him very unpleasant to talk to.)

myriad

(adj.) consisting of a very great number (It was difficult to decide what to do on Saturday night because the city presented us with myriad possibilities for fun.)

nadir

(n.) the lowest point of something (My day was boring, but the nadir came when my new car was stolen.)

nominal

(adj.) trifling, insignificant (Because he was moving the following week and needed to get rid of his furniture more than he needed money, Kim sold everything for a nominal price.)

novice

(n.) a beginner, someone without training or experience (Because we were all novices at archery, our instructor decided to begin with the basics)

nuance

(n.) a slight variation in meaning, tone, expression (The nuances of the poem were not obvious to the casual reader, but the teacher was able to point them out.)

oblivious

(adj.) lacking consciousness or awareness of something (Oblivious to the burning smell emanating from the kitchen, my father did not notice that the rolls in the oven were burned until much too late.)

obsequious

(adj.) excessively compliant or submissive (Donald acted like Susan's servant, obeying her every request in an obsequious manner.)

obtuse

(adj.) lacking quickness of sensibility or intellect (Political opponents warned that the prime minister's obtuse approach to foreign policy would embroil the nation in mindless war.)

panacea

(n.) a remedy for all ills or difficulties (Doctors wish there was a single panacea for every disease, but sadly there is not.)

parody

(n.) a satirical imitation (A hush fell over the classroom when the teacher returned to find Magdalena acting out a parody of his teaching style.)

penchant

(n.) a tendency, partiality, preference (Fiona's dinner parties quickly became monotonous on account of her penchant for Indian dishes.)

perusal

(n.) a careful examination, review (The actor agreed to accept the role after a three-month perusal of the movie script.)

plethora

(*n.*) an abundance, excess (The wedding banquet included a plethora of oysters piled almost three feet high.)

predilection

(*n.*) a preference or inclination for something (James has a predilection for eating toad in the whole with tomato ketchup.)

quaint

(*adj.*) charmingly old-fashioned (Mary was delighted by the quaint bonnets she saw in Romania.)

rash

(*adj.*) hasty, incautious (It's best to think things over calmly and thoroughly, rather than make rash decisions.)

refurbish

(*v.*) to restore, clean up (After being refurbished the old Triumph motorcycle commanded the handsome price of \$6000.)

repudiate

(*v.*) to reject, refuse to accept (Tom made a strong case for an extension of his curfew, but his mother repudiated it with a few biting words.)

rife

(*adj.*) abundant (Surprisingly, the teacher's writing was rife with spelling errors.)

salient

(*adj.*) significant, conspicuous (One of the salient differences between Alison and Helen is that Alison is a couple of kilos heavier.)

serendipity

(*n.*) luck, finding good things without looking for them (In an amazing bit of serendipity, penniless Mark found a \$50 bill on the back seat of the bus.)

staid

(*adj.*) sedate, serious, self-restrained (The *staid* butler never changed his expression no matter what happened.)

superfluous

(*adj.*) exceeding what is necessary (Samantha had already won the campaign so her constant flattery of others was *superfluous*.)

sycophant

(*n.*) one who flatters for self-gain (Some see the people in the cabinet as the Prime Minister's closest advisors, but others see them as *sycophants*.)

taciturn

(*adj.*) not inclined to talk (Though Magda never seems to stop talking, her brother is quite *taciturn*.)

truculent

(*adj.*) ready to fight, cruel (This club doesn't really attract the dangerous types, so why was that bouncer being so *truculent*?)

umbrage

(*n.*) resentment, offence (He called me a lily-livered coward, and I took *umbrage* at the insult.)

venerable

(*adj.*) deserving of respect because of age or achievement (The *venerable* High Court judge had made several key rulings in landmark cases throughout the years.)

vex

(*v.*) to confuse or annoy (My boyfriend *vexes* me by pinching my bottom for hours on end.)

vociferous

(*adj.*) loud, boisterous (I'm tired of his *vociferous* whining so I'm breaking up with him.)

wanton

(*adj.*) undisciplined, lewd, lustful (Joanna's wanton demeanor often made the frat guys next door very excited.)

zenith

(*n.*) the highest point, culminating point (I was too nice to tell Emily that she had reached the absolute zenith of her career with that one top 10 hit of hers.)

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